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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/826,341

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Shigeo Irie

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EXAMINER

LIU, MICHAEL

ART UNIT

PAPER NUMBER

2851

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/826,341

Applicant(s)

IRIE, SHIGEO

Examiner

Michael Liu

Art Unit

2851

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected:
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 09/891,213.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>20040419</u> . | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. Claims 1-16 are pending in the application.

#### *Specification*

2. Applicant is reminded of the proper content of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:

- (1) if a machine or apparatus, its organization and operation;
- (2) if an article, its method of making;
- (3) if a chemical compound, its identity and use;
- (4) if a mixture, its ingredients;
- (5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

The abstract of the disclosure is objected to because it is too broad. The abstract should mention using oxygen plasma to clean the mask and there being a separate removing unit. Correction is required. See MPEP § 608.01(b).

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: EUV exposure apparatus and method to clean mask.

4. The disclosure is objected to because of the following informalities: On page 21 line 11, the typo "does" should be changed to --dose--.

Appropriate correction is required.

***Claim Objections***

5. The following claims are objected to because of the following informalities:

In claim 2, "Wherein" is not at the beginning of the sentence and should not be capitalized.

In claim 7, "relective" is a typo for --reflective--.

In claims 8, 9, 13, periods are missing. Moreover, a punctuation comma is also missing from claim 9.

In claim 12, the claim is repeated and includes the extraneous phrase "said photo mask holder..."

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-8 are rejected under 35 U.S.C. 102(e) as being anticipated by Chiba et al (6,418,187).

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**Re claim 1:** Chiba et al discloses an exposure apparatus [Fig 19] comprising a vacuum chamber [inherent in X-ray system] and an optical system C, which includes an extreme ultraviolet radiation source [1; 17-18: EUV (13 nm) falls within the wavelength range of X-ray (0.2-15 nm)] and a photo mask E,

wherein said vacuum chamber includes a substrate holder H to hold a substrate F having a resist film formed on a surface of said substrate, a photo mask holder G to hold a photo mask, a gas inlet M', a gas outlet M, and a removing unit N,

said optical system is used for exposing the resist film to extreme ultraviolet radiation via said photo mask in said vacuum chamber, in which a desired pattern has been formed, and thereby transferring the pattern from said photo mask onto the resist film [see Fig 19]; and

said removing unit removes a deposit formed on said photo mask [10; 27-30].

**Re claim 2:** wherein [view Fig 20 at 90° clockwise rotation] said substrate holder H is provided in a lower region of said vacuum chamber, and said removing unit L is provided in an upper region of said vacuum chamber.

**Re claim 3:** wherein [view Fig 20 at 90° clockwise rotation] said photo mask holder G is provided above said substrate holder H, and said photo mask holder G is provided in a different location from said removing unit L.

**Re claims 4, 6:** wherein said removing unit removes said deposit by using plasma generated from a gas induced from said gas inlet [10; 27-30: oxygen plasma].

**Re claim 5:** wherein said gas outlet M allows a gas generated from said removing unit to escape.

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**Re claim 7:** further comprising a reflective mirror C in said vacuum chamber, which reflects light from said extreme ultraviolet radiation source to induce said substrate through said photo mask.

**Re claim 8:** wherein said removing unit P is provided between said gas inlet M' and said gas outlet M in said vacuum chamber.

8. Claims 1-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Shiraishi (6,842,221).

**Re claims 1, 9:** Shiraishi discloses an exposure apparatus 200 comprising a vacuum chamber [inherent in EUV system] and an optical system 2, which includes an extreme ultraviolet radiation source [41; 51] and a photo mask R,

wherein said vacuum chamber includes a substrate holder 35 to hold a substrate W having a resist film formed on a surface of said substrate, a photo mask holder 14 to hold a photo mask, a gas inlet 23, a gas outlet 24, a transfer unit 20 and a removing unit RI,

said optical system is used for exposing the resist film to extreme ultraviolet radiation via said photo mask in said vacuum chamber [see Fig 1], in which a desired pattern has been formed, and thereby transferring the pattern from said photo mask onto the resist film; and

said transfer unit transfers said photo mask from said photo mask holder to said removing unit [see arrows by 80 in Fig 1], and said removing unit removes a deposit formed on said photo mask [29; 24-27].

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**Re claims 2, 10:** wherein [see Fig 1] said substrate holder is provided in a lower region 40 of said vacuum chamber, and said removing unit is provided in an upper region RI of said vacuum chamber.

**Re claims 3, 11:** wherein [see Fig 1] said photo mask holder 14 is provided above said substrate holder 35, and

said photo mask holder 14 is provided in a different location from said removing unit RI.

**Re claims 4, 12:** wherein said removing unit removes said deposit by using plasma [24; 16-17: AF62, CF62, CF61] generated from a gas induced from said gas inlet.

**Re claims 5, 13:** wherein said gas outlet 24 allows a gas generated from said removing unit to escape.

**Re claims 6, 14:** wherein said gas includes oxygen [1; 42-43 & 24; 13].

**Re claims 7, 15:** further comprising a reflective mirror 3, 9 in said vacuum chamber, which reflects light from said extreme ultraviolet radiation source to induce said substrate through said photo mask.

**Re claims 8, 16:** wherein said removing unit 80 is provided between said gas inlet 23 and said gas outlet 24 in said vacuum chamber.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 9-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chiba et al (6,418,187) in view of Kawata (6,038,015).

**Re claim 9:** Chiba discloses an exposure apparatus [Fig 19] comprising a vacuum chamber [inherent in X-ray system] and an optical system C, which includes an extreme ultraviolet radiation source [1; 17-18: EUV (13 nm) falls within the wavelength range of X-ray (0.2-15 nm)] and a photo mask E,

wherein said vacuum chamber includes a substrate holder H to hold a substrate F having a resist film formed on a surface of said substrate, a photo mask holder G to hold a photo mask, a gas inlet M', a gas outlet M, and a removing unit N,

said optical system is used for exposing the resist film to extreme ultraviolet radiation via said photo mask in said vacuum chamber, in which a desired pattern has been formed, and thereby transferring the pattern from said photo mask onto the resist film [see Fig 19]; and

said removing unit removes a deposit formed on said photo mask [10; 27-30].

**Re claim 10:** wherein [view Fig 20 at 90° clockwise rotation] said substrate holder H is provided in a lower region of said vacuum chamber, and said removing unit L is provided in an upper region of said vacuum chamber.

**Re claim 11:** wherein [view Fig 20 at 90° clockwise rotation] said photo mask holder G is provided above said substrate holder H, and said photo mask holder G is provided in a different location from said removing unit L.



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**Re claims 12, 14:** wherein said removing unit removes said deposit by using plasma generated from a gas induced from said gas inlet [10; 27-30: oxygen plasma].

**Re claim 13:** wherein said gas outlet M allows a gas generated from said removing unit to escape.

**Re claim 15:** further comprising a reflective mirror C in said vacuum chamber, which reflects light from said extreme ultraviolet radiation source to induce said substrate through said photo mask.

**Re claim 16:** wherein said removing unit P is provided between said gas inlet M' and said gas outlet M in said vacuum chamber.

Chiba does not expressly teach a transfer unit.

Kawata discloses a transfer unit 6 that transfers said photo mask from said photo mask holder to said removing unit P2.

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to replace the wall between exposure chamber O and removing unit N with a shutter to allow the mask E to be transferred inside the two chambers by a transfer unit, as is done in the invention of Kawata, for the purpose of preventing the mask from being exposed to the outside environment and thereby being contaminated.

### **Conclusion**

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Liu whose telephone number is 571-272-9019. The examiner can normally be reached on Monday through Friday 9 am - 5 pm EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diane Lee can be reached on 571-272-2399. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michael Liu  
Examiner  
Art Unit 2851

ML 20070327



**HENRY HUNG NGUYEN**  
**PRIMARY EXAMINER**